

TEST REPORT No. 282

MATERIAL NAME: LITEST1 - Arenarie / Sandstones

CLIENT : MARMILAME S.R.L.

STONELAB BY IMM **TECHNOLOGICAL LABORATORY FOR TESTING ON STONES**

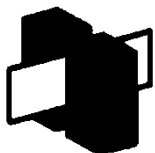


PERFORMED TESTS:

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|---|------------------|
| 1. Apparent Density-Open Porosity (EN 1936:2006*) | Table 1 |
| 2. Water Absorption (EN 13755:2008*) | Table 2 |
| 3. Abrasion resistance (EN 14157:2017*) | Table 3-4 |
| 4. Linear Thermal Dilatation (EN 14581:2005*) | Table 5 |
| 5. Resistance to Freeze/Thaw cycles (EN 12371:2010* - aesthetics) | |
| 6. Resistance to Thermal Shock cycles (EN 16140:2016* - aesthetics) | |

The Test Report No. 282 consists of 7 pages including this one.

Technological Laboratory Dr. Geol. Marco Mazzoni		DATE: August 02 nd , 2018
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<p>STONELAB by IMM Technological Laboratory Viale G.Galilei, 133 - 54033 M. di Carrara - Italy Tel. +39 0585 787963 - Fax. +39 0585 787602 E-mail: m.mazzoni@immcarrara.it A.S.T.M. MEMBER No. 1741518</p>	<p>TEST REPORT No. 282 (RESULTS SUMMARY TABLE)</p>
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By request of **MARMILAME S.R.L.** - Via Dorsale, 54 – 54100 – MASSA – ITALY the under listed Tests have been performed on specimens of the material named by **MARMILAME S.R.L.: “LITEST1 - Arenarie / Sandstones”**. The relevant results have been reported in the tables enclosed to this document. The specimens under testing have been consigned to this laboratory by **MARMILAME S.R.L.** in date June 26th, 2018.

NOTE:

The symbol (*) near the Test method codes highlights the fact that the tested material aren't stone materials but, actually, composite materials.

Type of Test	Ref. Std.	Units	Conditioning	Average values	Std. Dev.
Apparent Density (Table 1)	EN 1936:2006*	Kg/m ³	-	1301,57	-
Open Porosity (Table 1)	EN 1936:2006*	%	-	3,60	-
Water Absorption (Table 2)	EN 13755:2006*	%	-	2,77	-
Abrasion Resistance (Table 3)	EN 14157:2017*	mm	Dry	19,0	-
Abrasion Resistance – Hardened surface (Table 4)	EN 14157:2017*	mm	Dry	18,5	-
Linear Thermal Dilatation (Table 5)	EN 14581:2005*	α coef. (10 ⁻⁶ /°C)	Dry	17,2	-
Resistance to Freeze/Thaw cycles	EN 12371:2010* (Aesthetics)	No noticeable surface aesthetic variations after No. 56 EN 12371:2010* Freeze/ Thaw cycles			
Resistance to Thermal Shock cycles	EN 16140:2016* (Aesthetics)	No noticeable surface aesthetic variations after No. 20 EN 16140:2016* Thermal Shock cycles			

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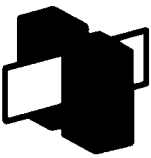


Table 1

IMM Carrara S.p.A STONELAB TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES		Apparent Density and Open Porosity (EN 1936:2006*)				Client: MARMILAME S.r.l.		
Test Report No.: 282						Material's commercial Name(s): LITEST1 - Arenarie / Sandstones		
						Specimens' delivery date: 26/06/2018		
Specim No.	Specimens' weight					Apparent Density [kg/m ³]	Open Porosity (%)	Specimen Dimension (mm)
	After Dry conditioning (>48 hrs. / 70°C)		After Wet conditioning (>48 hrs. / 20°C)					
	Date	g (m _d)	Date	g (m _s)	g (m _h)			
01	07/06/18	28,18	07/09/18	28,79	7,29	1310,70	2,84	99,4x99,4x1,8
02	07/06/18	21,48	07/09/18	22,14	5,52	1292,42	3,97	99,1x99,0x1,6
03	07/06/18	24,37	07/09/18	25,09	6,66	1322,30	3,91	99,3x99,2x1,7
04	07/06/18	32,04	07/09/18	32,73	8,17	1304,56	2,81	99,5x99,5x1,8
05	07/06/18	24,73	07/09/18	25,54	6,31	1286,01	4,21	99,3x99,3x1,7
06	07/06/18	22,26	07/09/18	22,93	5,72	1293,43	3,89	99,1x99,1x1,7
				Min.	Avg.	Max.		
Apparent Density ρ_b [kg/m³]				1286,01	1301,57	1322,30		
Open Porosity (%)				2,81	3,60	4,21		

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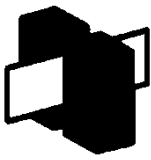



Table 2

IMM Carrara S.p.A STONELAB TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES		Water Absorption at atmospheric pressure (EN 13755:2008*)			Client: MARMILAME S.r.l.										
Test Report No.: 282					Material's commercial Name(s): LITEST1 - Arenarie / Sandstones										
					Specimens' delivery date: 26/06/2018										
Specim No.	Specimens' weight						Specimen Dimension (mm)								
	After Dry conditioning (>48 hrs. / 70°C)		After Wet conditioning (>48 hrs. / 20°C)		(m _s -m _d)	100x (m _s -m _d)/m _d									
	Date	g (m _d)	Date	g (m _s)	[g]	[%]									
01	07/12/18	28,18	07/16/18	28,79	0,61	2,16	99,4x99,4x1,8								
02	07/12/18	21,48	07/16/18	22,14	0,66	3,07	99,1x99,0x1,6								
03	07/12/18	24,37	07/16/18	25,09	0,72	2,95	99,3x99,2x1,7								
04	07/12/18	32,04	07/16/18	32,73	0,69	2,15	99,5x99,5x1,8								
05	07/12/18	24,73	07/16/18	25,54	0,81	3,28	99,3x99,3x1,7								
06	07/12/18	22,26	07/16/18	22,93	0,67	3,01	99,1x99,1x1,7								
<table><tr><td></td><td>Min.</td><td>Avg.</td><td>Max.</td></tr><tr><td>Water absorption A_b, weight (%)</td><td>2,15</td><td>2,77</td><td>3,28</td></tr></table>									Min.	Avg.	Max.	Water absorption A_b, weight (%)	2,15	2,77	3,28
	Min.	Avg.	Max.												
Water absorption A_b, weight (%)	2,15	2,77	3,28												
Maximum expected Value A_b, weight (%): 4,23															
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Table 3

		Abrasion Resistance (EN 14157:2017*)		Client: MARMILAME S.r.l.	
Test Report No.: 282			Material's commercial Name: LITEST1 - Arenarie / Sandstones Untreated surface		
Specimens' delivery date: 26/06/2018			Type of Test: Method A (Wide Wheel Abrasion Test)		
Specimen No.	Calibration factor (mm)	Width of the groove (corrected by the calibration factor) (mm)	Avg. width of the groove (corrected by the calibration factor): 19,4 mm Approximated Avg. Value for CE marking purposes : 19,0 mm	Specimen dimension [mm]	
01	-0,4	19,2		100x70x30	
02		19,6		100x70x30	
03		19,4		100x70x30	
04		19,4		100x70x30	
05		19,6		100x70x30	
06		19,3		100x70x30	

Note:

Before being subjected to the abrasion Test, the specimens have been dried in a ventilated oven ($T = 70^{\circ}\text{C}$) until the reaching of a constant mass.

Calibration factor: arithmetic difference between the 20 mm value and the calibration value (expressed in mm).



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Table 4

		Abrasion Resistance (EN 14157:2017*)		Client: MARMILAME S.r.l.	
Test Report No.: 282			Material's commercial Name: LITEST1 - Arenarie / Sandstones Hardened surface		
Specimens' delivery date: 26/06/2018			Type of Test: Method A (Wide Wheel Abrasion Test)		
Specimen No.	Calibration factor (mm)	Width of the groove (corrected by the calibration factor) (mm)	Avg. width of the groove (corrected by the calibration factor): 18,7 mm Approximated Avg. Value for CE marking purposes : 18,5 mm	Specimen dimension [mm]	
01	-0,4	18,5		100x70x30	
02		18,7		100x70x30	
03		18,7		100x70x30	
04		18,8		100x70x30	
05		18,6		100x70x30	
06		18,7		100x70x30	

Note:

Before being subjected to the abrasion Test, the specimens have been dried in a ventilated oven (T = 70°C) until the reaching of a constant mass.

Calibration factor: arithmetic difference between the 20 mm value and the calibration value (expressed in mm).

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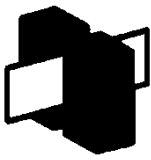


Table 5

IMM Carrara S.p.A STONELAB TECHNOLOGICAL LABORATORY QUALITY TESTS ON DIMENSION STONES AND COMPOSITES	Determination of linear thermal expansion (EN 14581:2004*)		Client: MARMILAME S.r.l.				
Test Report No.: 282		Material name: LITEST1 - Arenarie / Sandstones					
		Specimens' delivery date: 26/06/2018					
Specim No.	Specimen length (mm)		Actual values				Specimen Dimension (mm)
	T = 20°C	T = 80°C	ΔT [°C]	ΔL [mm]	α_1 ($10^{-6}/^{\circ}C$)	α ($10^{-6}/^{\circ}C$)	
01	250,87	251,13	60	0,26	17,2	17,2	250,87x50x1.8
02	250,94	251,20	60	0,26	17,5		250,94x50x1.8
03	258,76	259,03	60	0,27	17,1		258,76x50x1.8
04	251,12	251,37	60	0,25	16,9		251,12x50x1.8
Average Linear Thermal Expansion ($10^{-6}/^{\circ}C$) = 17,2							

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